AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Yasuhiko Morimoto et al.	Docket Number:	JP920000043US1
Serial No.:	09/825,013	Examiner:	H.Q. Pham
Filed:	04/03/01	Group Art:	2172
Title:	SPATIAL DATA MINING METHOD, SPATIAL DATA MINING APPARATUS AND STORAGE MEDIUM		

TRANSMITTAL OF APPEAL BRIEF

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Yasuhiko Morimoto et al.   Docket No.: JP920000043US1

Serial No.: 09/825,013   Group Art Unit: 2172

Filed: 04/03/01   Examiner: H.Q. Pham

For: SPATIAL DATA MINING METHOD, SPATIAL DATA MINING APPARATUS AND STORAGE AND STORAGE MEDIUM

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Application No. 09/825,013

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of:

Yasuhiko MORIMOTO et al.

Application No.: 09/825,013 Examiner: H. Q. PHAM

Filed: April 3, 2001 Docket No.: JP920000043

For: SPATIAL DATA MINING METHOD, SPATIAL DATA MINING APPARATUS AND STORAGE MEDIUM

APPEAL BRIEF

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I. INTRODUCTION

This is an Appeal from a Final Office Action dated June 7, 2004, finally rejecting claims 1-13 and 15-23 of the above-identified patent application. Claim 14, indicated as allowable by the Examiner, is not addressed in this Appeal.

A. Real Party In Interest

The real party in interest for this Appeal in the present application is IBM CORPORATION, by way of an Assignment recorded at reel 011733, frame 0603.

B. Statement of Related Appeals and Interferences

There are presently no appeals or interferences, known to Appellants, Appellants' representative or the Assignee, which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

C. Status of Claims

Claims 1-13 and 15-23 stand finally rejected, and are on appeal. Claims 1-13 and 15-23, are set forth in the attached appendix. Of the claims on appeal, claims 1, 6, 11, 12, 15, 17 and 20-23 are independent, claims 2-5 depend directly from claim 1, claims 7-10 depend directly from claim 6, claim 13 depends directly from claim 12, claim 16 depends directly from claim 15, and claims 18-19 depend directly from claim 17. Claim 14, indicated as allowable by the Examiner, is not addressed in this Appeal.

D. Status of Amendments

An Amendment After Final Rejection was filed on September 2, 2004, subsequent to the Final Office Action, as suggested by the Examiner, to place the application in better condition for appeal. However, as indicated in the Advisory Action, the September Amendment will not be entered upon the submission of this Brief of Appeal.

II. SUMMARY OF THE INVENTION AND APPLIED REFERENCES

A. The Claimed Invention

According to the various exemplary aspects of the invention, a spatial data mining method is provided (Fig. 3) for introducing spatial rules from a database (Fig. 4) in which spatial information, including addresses (pg. 24, line 24 to pg. 25, line 2), is stored. The method includes the steps of providing (step 101) from the database a starting point or a starting point group (12 to 14), defining (step 103) an objective function that is examined in order to introduce the spatial rules, and calculating (step 104) a distance or an orientation block originating at the starting point or the starting point group in order to optimize the objective function that is defined.

In accordance to these exemplary aspects, the objective function is a function for which a distance or an orientation requested by an analyzation business is not provided (pg. 35, lines 12-18).

In accordance to these exemplary aspects, the method further includes a step of entering as input parameters (Fig. 5) the definition of a distance, the definition of the starting point or the starting point group and the definition of the objective function (pg. 34, lines 11-17).

In accordance to these exemplary aspects, the step of calculating the distances, an intermediate table (see Fig. 12, generator 30) is generated (pg. 20, line 28 to pg. 21, line 5) based on starting point set data consisting of the starting point group and the objective function, and in accordance with distance values, attribute values for query points in the database are added together, based on the intermediate table (pg. 23, line 25 to pg. 24, line 4).

In accordance to these exemplary aspects, the method further includes a step (Fig. 2) of displaying on a map (11) the distance or the orientation block (18 to 20) relative to the starting point or the starting point group (12 to 14).

According to other various exemplary aspects of the invention, the spatial data mining method includes the step employing the starting point or the starting point group (12 to 14) to define an orientation (pg. 16, lines 1-11).

In accordance to these exemplary aspects, the orientation block is obtained by employing the numerical value of the orientation used to optimize the objective function (pg. 16, lines 1-22).

In accordance to these exemplary aspects, a search objective data range, at equal distances from the starting point and from the starting point group, that is appropriate for calculating an orientation is selected as the orientation block (pg. 16, lines 1-22).

According to other various exemplary aspects of the invention, a spatial data mining method is provided for generating a data table (see Fig. 12, generator 30) used to introduce a spatial rule obtained from a spatial information database (Fig. 4). The method includes the steps of providing a set of starting points and a set of query points in a database (Fig. 4), designating an upper limit (circle) for a distance between the set of starting points and the set of query points, calculating a distance (optimal distance calculator 39) between each starting point and each query point, calculating an angle formed between a starting point and a query point whose distance from the starting point does not exceed the designated upper limit (pg. 31, line 24 to pg. 32, line 4), and generating a data table using the angle formed with the starting point (pg. 32, lines 5-6).

According to other various exemplary aspects of the invention, a spatial data mining apparatus (Fig. 12) is provided for calculating an optimal distance from a database (Fig. 4), wherein spatial information, including addresses (pg. 24, line 24 to pg. 25, line 2), is stored. The apparatus includes input means (77) for inputting of an objective function required for the optimization of a distance, intermediate table generation means (30) for employing in the database starting point data and query point data (Fig. 12) for calculating the distances between each starting point and each query point and generating an intermediate table, and optimal distance calculation means (39) for calculating a distance, based on the intermediate table generated by the intermediate table generation means, in order to optimize the value of the objective function that is entered by the input means.

In accordance to these exemplary aspects, the intermediate table generation means includes Voronoi diagram preparation means (31) for preparing a Voronoi diagram by using the starting point data (S8, S12, S19) in the database, distance calculation means (32) for employing the Voronoi diagram, prepared by the Voronoi diagram preparation means, and the query point data in the database to calculate distances between individual starting points and individual query points and to generate data records (pg. 16, lines 15-20), and individual distance calculation means (33) for selecting an optimization function from among objective functions to be examined, and adding together record values, collected from the data records, that are required for optimization of each of the distances (pg. 16, lines 20-23).

According to other various exemplary aspects of the invention, a spatial data mining apparatus (Fig. 12) is provided for calculating an optimal orientation for a database (Fig. 4), which includes spatial information, including addresses (pg. 24, line 24 to pg. 25, line 2). The apparatus includes input means (77) for inputting of an objective function required for the optimization of an orientation, intermediate table generation means (30) for employing, based on starting point data and query point data in the database, angles of 0 degrees from the starting points in a specific direction to generate an intermediate table in which the orientation of the locations of the query points are included (pg. 32, lines 3-4), and optimal orientation calculation means (39) for calculating an orientation, based on the intermediate table generated by the intermediate table generation means, for optimizing the value of the objective function that is entered by the input means (pg. 33, line 24 to pg. 34, line 10).

In accordance to these exemplary aspects, the intermediate table generation means (30) includes Voronoi diagram preparation means (31) for preparing a Voronoi diagram by using the starting point data in the database, distance calculation means (32) for employing the Voronoi diagram prepared by the Voronoi diagram preparation means and the query point data in the database to calculate distances between individual starting points and individual query points, orientation calculation means (32) for calculating, based on the distances obtained by the distance calculation means, orientations of the starting points with the query points that fall within a designated distance upper limit, and storing the orientations as data records for the intermediate table (pg. 32, line 3 to pg. 34, line 14), and individual orientation calculation means (33) for selecting an optimization function from among objective functions to be examined, and collecting and adding record values, from the data records, that are required for optimization of each of the distances.

According to other various exemplary aspects of the invention, a spatial data mining apparatus (Fig. 12) is provided for calculating an optimal distance from or an optimal orientation with a database (Fig. 4) in which spatial information, including addresses (pg. 24, line 24 to pg. 25, line 2), is stored, and for outputting the optimal distance or the optimal orientation. The apparatus includes input means (77) for the input of an objective function for which a distance or an orientation requested by an analyzation business is not provided (pg. 5, lines 11-15), optimal distance/orientation calculation means (39) for employing starting point data and query point data in the database for calculating a distance between, or the orientation of each of the starting points with each of the query points, and calculating the optimal

distance or the optimal orientation for the optimization of the value of the objective function, and display means (76) for displaying, on the screen of a geographical information system, the optimal distance or the optimal orientation calculated by the optimal distance/orientation calculation means.

In accordance to these exemplary aspects, the display means (76) uses the optimal distance calculated by the optimal distance/orientation calculation means (39) for the display of circular areas (Fig 2), the centers of which are starting points.

In accordance to these exemplary aspects, the display means (76) uses the optimal orientation, calculated by the optimal distance/orientation calculation means, for the display of fan-shaped portions of the circular areas (Fig. 2), the origins of the fan-shaped portions being the starting points at the centers of the circular areas.

According to other various exemplary aspects of the invention, a spatial data mining apparatus (Fig. 12) is provided for introducing a spatial rule from a database (Fig. 4), which also includes spatial information, including addresses (pg. 24, line 24 to pg. 25, line 2). The apparatus includes starting point provision means (42) for providing starting points or starting point groups (12 to 14) obtained from the database, objective function definition means for defining an objective function that is to be examined in order to introduce the spatial rule, and distance calculation means (32) for calculating distances originating at the starting points or at the starting point groups for optimizing the objective function that is defined.

According to other various exemplary aspects of the invention, a spatial data mining apparatus (Fig. 12) is provided for introducing a spatial rule from a database (Fig. 4), which

also includes spatial information, including addresses (pg. 24, line 24 to pg. 25, line 2). The apparatus includes starting point provision means (42) for providing starting points or starting point groups (12 to 14) obtained from the database, orientation definition means (77) for employing the starting points or the starting point groups to define distances or orientations, objective function definition means (77) for defining an objective function that is to be examined in order to introduce the spatial rule, and orientation block calculation means (32) for calculating orientation blocks beginning at the starting points or the starting point groups to optimize the objective function that is defined.

According to other various exemplary aspects of the invention, a spatial data mining apparatus (Fig. 12) is provided for generating data table for introducing a spatial rule from a database (Fig. 4), which also includes spatial information, including orientation. The apparatus includes starting point/query point provision mean (42) for providing a set of starting points (12 to 14) and a set of query points in the database, distance upper limit designation means (33) for designating the upper limit (circle) for a distance between the set of starting points and the set of query points, distance calculation means (32) for calculating a distance between each starting point and each query point, angle calculation means (32) for calculating an angle formed between a starting point and a query point whose distance from the starting point does not exceed the designated upper limit, and a data table generation means (30) for generating a data table using the angle formed with the starting point.

B. <u>The Applied References</u>

1. <u>Spatial Data Mining: Process and Challenges Survey paper by Koperski et</u>

al. (Koperski)

Koperski describes mining knowledge from large amounts of spatial data, where huge amounts of spatial data have been collected in various applications, ranging from remote sensing, to geographical information systems, computer cartography, environmental assessment and planning, and the like.

That is, in Koperski, spatial data mining is used for determining distances in advance through the introduction of correlated spatial rules, wherein distance predicate terms "close to" and "far from" are defined and correlated spatial rules are introduced from a database.

As discussed in section 1.1.1 "Primitives of Spatial Data Mining" of Koperski, Various kinds of rules can be discovered from databases in general, such as characteristic rules, discriminant rules, association rules, or deviation and evolution rules.

Koperski does not disclose any calculation of distances, and is silent as to optimizing a defined objective function. Koperski is also discussed in the "Background of the Invention" of the application at pg. 2, line 3 to pg. 3, line 18.

2. Clustering for Mining in Large Spatial Databases paper by Ester et al. (Ester)

Ester discloses a database-oriented clustering method, wherein partitioning algorithms are used to construct a partition of a database of objects into a set of clusters wherein the number of clusters is an input parameter. See section 3.1, "Partitioning Clustering Algorithms." Each cluster is represented by the gravity center of the cluster or by one of the objects of the cluster located near its center and each object is assigned to the cluster with the closest representative. As indicated in this section, "This implies that the resulting clustering is equivalent to a Voronoi

diagram of all representatives."

3. Finding Aggregate Proximity Relationships and Commonalities in Spatial Data Mining paper by Knorr et al. (Knorr)

Knorr is directed to spatial knowledge discovery problems involving proximity relationships between clusters and features. As discussed in section 2.1, "Geometric Terminology," Knorr evaluates existing geometric techniques for computing aggregate proximity relationships, wherein the geometric shapes includes isothetic rectangles and encompassing circles.

III. THE ISSUES ON APPEAL

Whether under 35 U.S.C. § 103, the Examiner has established a *prima facie* case that claims 1-12, 15, 17 and 20-23 would have been obvious over Koperski , that claims 13 and 16 would have been obvious over Koperski in view of Ester, and that claims 18 and 19 would have been obvious over Koperski in view of Knorr. Claim 14, indicated as allowable by the Examiner, is not addressed in this Appeal.

IV. GROUPING OF THE CLAIMS ON APPEAL

Claims 20 and 23 stand or fall with claim 1. Claim 21 stands or falls with claim 6. Claims 12 and 22 stand or fall with claim 11. Claims 2-5 stand or fall together. Claims 7-10 stand or fall together. Claims 18 and 19 stand or fall together. Each of the remaining claims stands or falls separately.

V. ARGUMENT

A. The Law

1. 35 U.S.C. § 103

As required by MPEP 2142:

> To reach a proper determination under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information the examiner must then make a determination whether the claimed invention 'as a whole" would have been obvious at that time to that person. Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process.

The Supreme Court in Graham v. John Deere, 383 U.S. 1 at 18, 148 USPQ 459 at 467 (1966), set forth the basic test for patentability under 35 U.S.C. §103:

> Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unresolved need, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter to be patented.

Moreover, in In re Ehrreich and Avery, 200 USPQ 504, 509-510 (CCPA 1979), the Court of Customs and Patent Appeals further clarified the basic test set forth in Graham v. John Deere:

> We must not here consider a reference in a vacuum, but against the background of the other references of record which may disprove theories and speculations in the reference or reveal previously

> undiscovered or unappreciated problems. The question in a §103 case is what the references would collectively suggest to one of ordinary skill in the art. In re Simon, 461 F.2d 1387, 174 USPQ 114 (CCPA 1972). It is only by proceeding in this manner that we may fairly determine the scope and content of the prior art according to the mandate of Graham v. Deere Company, 383 US 1, 17, 148 USPQ 459, 467 (1966). (Emphasis in original.)

Thus, the mere fact that parts of prior art disclosures can be combined does not make the combination obvious unless the prior art also contains something to suggest the desirability of the combination. In re Imperato, 486 F.2d 585 (CCPA 1973).

To imbue one of ordinary skill in the art with knowledge of the invention, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of hindsight syndrome wherein that which only the inventor taught is used against its teacher. W.L. Gore & Assoc. v. Garlock, Inc., 721 F.2d 1540, 1533, 220 USPQ 303, 312-13 (Fed. Cir. 1983).

Where the prior art provides "only general guidance and is not specific as to the particular form of the invention or how to achieve it, [such a suggestion] may make an approach 'obvious to try,' but it does not make the invention obvious." Ex parte Obukowicz, 27 USPQ2d, 1063, 1065 (U.S. Patent and Trademark Office Board of Appeals and Interferences, 1992) and In re O'Farrell, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988).

B. Application of the Law to the Applied References

For at least the reasons set forth below, Appellants submit that Koperski, also discussed in the "Background of the Invention" of the application at pg. 2, line 3 to pg. 3, line 18, does not

disclose each and every element of claims 1-12, 15, 17 and 20-23. Further, Koperski and Ester, alone or in combination, do not disclose each and every element of claims 13 and 16, and Koperski and Knorr, alone or in combination, do not disclose each and every element of claims 18 and 19. Additionally, one having ordinary skill in the art would not have been motivated to combine the teachings of neither Ester nor Knorr to the teachings of Koperski.

1. <u>Claims 1, 20 and 23</u>

Claim 1 is directed to a method that includes the steps of providing from said database a starting point or a starting point group, defining an objective function that is examined in order to introduce said spatial rules, and calculating a distance from or an orientation block originating at said starting point or said starting point group in order to optimize said objective function that is defined. The Examiner asserts that the features of claim 1 would have been obvious over Koperski.

Claim 1 would be obvious over Koperski only if Koperski teaches or suggests each and every element as set forth in claim 1, and that one having ordinary skill in the art would have found the elements of claim 1 obvious from the teachings of Koperski. However, as admitted by the Final Office Action on page 5, Koperski does not disclose at least the step of calculating a distance or an orientation block originating at a starting point or a starting point group in order to optimize the objective function that is defined, as recited in claim 1. In fact, Koperski is silent as to any distance calculation and is not even concerned with optimizing the objective

function that is defined. These deficiencies of Koperski is also discussed in the "Background of the Invention" of the application at pg. 2, line 3 to pg. 3, line 18.

Instead, Koperski merely discloses discovering rules from a predefined predicate table that is stored in a database. In Koperski, various kinds of rules can be discovered from databases including spatial characteristic rules, spatial discriminant rules, spatial association rules, and the like. (See section 1.1.1, "Primitives of Spatial Data Mining.") The mining process is started by a query which is to describe of class of objects using other task relevant classes of objects, and a set of relevant relations, wherein first step of the algorithm collects the task-relevant data, and then, some efficient spatial computations are performed to extract spatial associations at the level of generalized spatial relations. (See page 64, "Algorithm for Multiple Level Spatial Association Rules.") The computations look for objects whose minimal bonding rectangles are located in the distance no greater than the threshold to satisfy predetermined predicates, such as "close to x" or "distance less than z," wherein the algorithm derives the rules based on the information stored in a predicate table.

Thus, as discussed in the above algorithm, the rules, such as spatial rules are derived without any distance calculation for optimizing objective functions. In other words, as discussed in the above sections, Koperski merely uses predicates that is already determined and stored in a database, instead of calculating the distances for optimizing objective function defined in a defining step.

As shown in these exemplary portions of Koperski, as admitted by the Final Office Action, there is no step of calculating a distance or an orientation block originating at a starting

point or a starting point group in order to optimize the objective function that is defined. From this assertion, the Final Office Action somehow inexplicably derives that Koperski obviously teaches the claimed invention.

However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of calculating a distance from or an orientation block originating at a starting point or a starting point group in order to optimize the objective function that is defined, as recited in the claim 1. The Final Office Action attempts to remedy this deficiency by asserting that "…in order to satisfy the one-kilometer threshold, obviously, a distance originating at the park as said starting point and other objects such as railway, restaurants, zoos… must be calculated, in order to optimize the defined query of discovering the spatial rule. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski method by including the step of calculating a distance in order to extract spatial rules relate to a query." However, contrary to the Final Office Action's assertions, there is no such distance calculation step in Koperski, because, as discussed on page 64 of Koperski, predetermined predicates, such as "close to x" or "distance less than z," are already determined and stored in the database. That is, contrary to the Final Office Action's assertions, there is no step of optimizing the defined query of discovering the spatial rule.

Further, the Final Office Action attempts to modify the teachings of Koperski without any support in Koperski for any such modification. The mere fact that parts of prior art disclosures can be modified is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claim 1 would not have been obvious over Koperski. Similarly, at least for the above reasons, claim 20 which recites a spatial data mining apparatus that includes starting point provision means for providing starting points or starting point groups obtained from said database, objective function definition means for defining an objective function that is to be examined in order to introduce said spatial rule, and distance calculation means for calculating distances originating at said starting points or at said starting point groups for optimizing said objective function that is defined would also not be obvious over Koperski.

Further, for at least the above reasons, claim 23 which recites a storage medium on which is stored a spatial data mining program, which introduces a spatial rule extracted from a database that includes spatial information, including addresses, based on an objective function for which neither a distance nor an orientation is provided, said program comprising the above steps also would not be obvious over Koperski.

2. <u>Claims 6 and 21</u>

Claim 6 is directed to a method that includes the steps of providing from a database a starting point or a starting point group, employing the starting point or the starting point group to define an orientation, defining an objective function that is examined in order to introduce spatial rules, and calculating a distance from or an orientation block originating at the starting point or the starting point group in order to optimize the objective function that is defined. The Examiner asserts that the features of claim 6 would have been obvious over Koperski.

Claim 6 would have been obvious over Koperski only if Koperski teaches or suggests each and every element as set forth in claim 6, and that one having ordinary skill in the art would have found the elements of claim 6 obvious from the teachings of Koperski. However, as admitted by the Final Office Action on page 8, Koperski does not disclose at least the step of calculating a distance or an orientation block originating at the starting point or the starting point group in order to optimize the objective function that is defined, as recited in claim 6.

Instead, Koperski merely discloses discovering rules from a predefined predicate table that is stored in a database. In Koperski, various kinds of rules can be discovered from databases including spatial characteristic rules, spatial discriminant rules, spatial association rules, and the like. (See section 1.1.1, "Primitives of Spatial Data Mining.") In Koperski, at page 64, "Algorithm for Multiple Level Spatial Association Rules," for example, computations are performed to look for objects whose minimal bonding rectangles are located in the distance no greater than the threshold to satisfy predetermined predicates, such as "close to x" or "distance less than z," wherein the algorithm derives the rules based on the information stored in a predicate table. In the algorithm, the rules, such as spatial rules are derived without any distance calculation for optimizing objective functions. In other words, as indicated in this portion, Koperski merely uses predicates that is already determined and stored in a database, instead of calculating the distances for optimizing objective function defined in a defining step.

As shown in these exemplary portions, as admitted by the Final Office Action, Koperski does not show the features of claim 6. From this assertion, the Final Office Action somehow inexplicably derives that Koperski obviously teaches the claimed invention.

However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of these features recited in the claim 6. The Final Office Action attempts to remedy this deficiency by asserting that "...in order to satisfy the one-kilometer threshold, obviously, a distance originating at the park as said starting point and other objects such as railway, restaurants, zoos... must be calculated, in order to optimize the defined query of discovering the spatial rule. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski method by including the step of calculating a distance in order to extract spatial rules relate to a query." However, contrary to the Final Office Action's assertions, there is no such distance calculation step in Koperski, because, as discussed on page 64 of Koperski, predetermined predicates, such as "close to x" or "distance less than z," are already determined and stored in the database. That is, contrary to the Final Office Action's assertions, there is no step of optimizing the defined query of discovering the spatial rule.

Further, the Final Office Action attempts to modify the teachings of Koperski without any support in Koperski for any such modification. The mere fact that parts of prior art disclosures can be modified is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claim 6 would not have been obvious over Koperski. Similarly, at least for the above reasons, claim 20 which recites a spatial data mining apparatus that includes starting point provision means for providing starting points or starting point groups obtained from said database, objective function definition means for defining an objective function that is to be examined in order to introduce said spatial rule, and distance

calculation means for calculating distances originating at said starting points or at said starting point groups for optimizing said objective function that is defined would also not be obvious over Koperski.

3. Claims 11, 12 and 22

Claim 11 is directed to a method that includes the steps of providing a set of starting points and a set of query points in a database, designating an upper limit for a distance between said set of starting points and said set of query points, calculating a distance between each starting point and each query point, calculating an angle formed between a starting point and a query point whose distance from said starting point does not exceed said designated upper limit, and generating a data table using said angle formed with said starting point. The Examiner asserts that the features of claim 11 would have been obvious over Koperski.

Claim 11 would have been obvious over Koperski only if Koperski teaches or suggests each and every element as set forth in claim 11, and that one having ordinary skill in the art would have found the elements of claim 11 obvious from the teachings of Koperski. However, as admitted by the Final Office Action on page 10, Koperski does not disclose at least the steps of calculating a distance between each starting point and each query point, calculating an angle formed between a starting point and a query point whose distance from said starting point does not exceed said designated upper limit, and generating a data table using said angle formed with said starting point, as recited in claim 11.

Instead, Koperski merely discloses discovering rules from a predefined predicate table that is stored in a database. See section 1.1.1, "Primitives of Spatial Data Mining" and page 64,

"Algorithm for Multiple Level Spatial Association Rules," for example. In the algorithm, the rules, such as spatial rules are derived without any distance calculation for optimizing objective functions. In other words, as discussed in the above sections, Koperski merely uses predicates that is already determined and stored in a database, instead of calculating the distances for optimizing objective function defined in a defining step.

As shown in these exemplary portions, as admitted by the Final Office Action, Koperski fails to disclose these features of claim 11. From this assertion, the Final Office Action somehow inexplicably derives that Koperski obviously teaches the claimed invention.

However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of these features recited in the claim 11. The Final Office Action attempts to remedy this deficiency by asserting that "...in order to satisfy the one-kilometer threshold, obviously, a distance originating at the park as said starting point and other objects such as railway, restaurants, zoos... must be calculated, in order to optimize the defined query of discovering the spatial rule. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski method by including the step of calculating a distance in order to extract spatial rules relate to a query." However, contrary to the Final Office Action's assertions, there is no such distance calculation step in Koperski, because, as discussed on page 64 of Koperski, predetermined predicates, such as "close to x" or "distance less than z," are already determined and stored in the database.

Further, the Final Office Action attempts to modify the teachings of Koperski without any support in Koperski for any such modification. The mere fact that parts of prior art disclosures

can be modified is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claim 11 would not have been obvious over Koperski. Similarly, at least for the above reasons, claim 12 which recites an apparatus that includes input means for inputting of an objective function required for the optimization of a distance, intermediate table generation means for employing in said database starting point data and query point data for calculating the distances between each starting point and each query point and generating an intermediate table, and optimal distance calculation means for calculating a distance, based on said intermediate table generated by said intermediate table generation means, in order to optimize the value of said objective function that is entered by said input means would also not be obvious over Koperski.

Further, for at least the above reasons, claim 22 which recites a spatial data mining apparatus that includes starting point/query point provision means for providing a set of starting points and a set of query points in said database, distance upper limit designation means for designating the upper limit for a distance between said set of starting points and said set of query points, distance calculation means for calculating a distance between each starting point and each query point, angle calculation means for calculating an angle formed between a starting point and a query point whose distance from said starting point does not exceed said designated upper limit, and a data table generation means for generating a data table using said angle formed with said starting pointis also not anticipated by Koperski.

4. <u>Claim 15</u>

Similarly, claim 15 is directed to a apparatus that includes input means for inputting of an objective function required for the optimization of an orientation, intermediate table generation means for employing, based on starting point data and query point data in said database, angles of 0 degrees from said starting points in a specific direction to generate an intermediate table in which the orientation of the locations of said query points are included, and optimal orientation calculation means for calculating, based on said intermediate table generated by said intermediate table generation means, an orientation for optimizing the value of said objective function that is entered by said input means. The Examiner asserts that the features of claim 15 would have been obvious over Koperski.

Claim 15 would have been obvious over Koperski only if Koperski teaches or suggests each and every element as set forth in claim 15, and that one having ordinary skill in the art would have found the elements of claim 15 obvious from the teachings of Koperski. However, as admitted by the Final Office Action on page 15, Koperski does not disclose at least means for calculating, based on said intermediate table generated by said intermediate table generation means, an orientation for optimizing the value of said objective function that is entered by said input means, as recited in claim 15.

Instead, Koperski merely discloses discovering rules from a predefined predicate table that is stored in a database. See section 1.1.1, "Primitives of Spatial Data Mining" and page 64, "Algorithm for Multiple Level Spatial Association Rules," for example. In the algorithm, the rules, such as spatial rules are derived without any distance calculation for optimizing objective functions. In other words, as discussed in the above sections, Koperski merely uses predicates

that is already determined and stored in a database, instead of calculating the distances for optimizing objective function defined in a defining step.

As shown in these exemplary portions, as admitted by the Final Office Action, Koperski fails to disclose the features of claim 15. From this assertion, the Final Office Action somehow inexplicably derives that Koperski obviously teaches the claimed invention.

However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of these features recited in the claim 15. The Final Office Action attempts to remedy this deficiency by asserting that "...in order to satisfy the one-kilometer threshold, obviously, a distance originating at the park as said starting point and other objects such as railway, restaurants, zoos... must be calculated, in order to optimize the defined query of discovering the spatial rule. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski method by including the step of calculating a distance in order to extract spatial rules relate to a query." However, contrary to the Final Office Action's assertions, there is no such distance calculation step in Koperski, because, as discussed on page 64 of Koperski, predetermined predicates, such as "close to x" or "distance less than z," are already determined and stored in the database.

Further, the Final Office Action attempts to modify the teachings of Koperski without any support in Koperski for any such modification. The mere fact that parts of prior art disclosures can be modified is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claim 15 would not have been obvious over Koperski.

5. <u>Claims 17</u>

Similarly, claim 17 is directed to a apparatus that includes input means for the input of an objective function for which a distance or an orientation requested by an analyzation business is not provided, optimal distance/orientation calculation means for employing starting point data and query point data in said database for calculating a distance between, or the orientation of each of the starting points with each of the query points, and calculating said optimal distance or said optimal orientation for the optimization of the value of said objective function, and display means for displaying, on the screen of a geographical information system, said optimal distance or said optimal orientation calculated by said optimal distance/orientation calculation means. The Examiner asserts that the features of claim 17 would have been obvious over Koperski.

Claim 17 would have been obvious over Koperski only if Koperski teaches or suggests each and every element as set forth in claim 17, and that one having ordinary skill in the art would have found the elements of claim 17 obvious from the teachings of Koperski. However, as admitted by the Final Office Action on page 17, Koperski does not disclose at least optimal distance/orientation calculation means for employing starting point data and query point data in said database for calculating a distance between, or the orientation of each of the starting points with each of the query points, and calculating said optimal distance or said optimal orientation for the optimization of the value of said objective function, and display means for displaying, on the screen of a geographical information system, said optimal distance or said optimal orientation calculated by said optimal distance/orientation calculation means, as recited in claim 17.

Instead, Koperski merely discloses discovering rules from a predefined predicate table that is stored in a database. See section 1.1.1, "Primitives of Spatial Data Mining" and page 64, "Algorithm for Multiple Level Spatial Association Rules," for example. As discussed in the algorithm, the rules, such as spatial rules are derived without any distance calculation for optimizing objective functions. In other words, as discussed in the above sections, Koperski merely uses predicates that is already determined and stored in a database, instead of calculating the distances for optimizing objective function defined in a defining step.

As shown in these exemplary portions, as admitted by the Final Office Action, Koperski fails to disclose the features of claim 17. From this assertion, the Final Office Action somehow inexplicably derives that Koperski obviously teaches the claimed invention.

However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of these features recited in the claim 17. The Final Office Action attempts to remedy this deficiency by asserting that "...in order to satisfy the one-kilometer threshold, obviously, a distance originating at the park as said starting point and other objects such as railway, restaurants, zoos... must be calculated, in order to optimize the defined query of discovering the spatial rule. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski method by including the step of calculating a distance in order to extract spatial rules relate to a query." However, contrary to the Final Office Action's assertions, there is no such distance calculation step in Koperski, because, as discussed on page 64 of Koperski, predetermined predicates, such as "close to x" or "distance less than z," are already determined and stored in the database.

Further, the Final Office Action attempts to modify the teachings of Koperski without any support in Koperski for any such modification. The mere fact that parts of prior art disclosures can be modified is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claim 17 would not have been obvious over Koperski.

Further, at least because claims 1, 6, 11, 12, 15, 17 and 20-23 would not have been obvious over Koperski, claims 2-5 depending directly from claim 1 and claims 7-10 depending directly from claim 6 also would not have been obvious over Koperski.

6. Claims 2-5

Claim 2 recites the method of claim 1, wherein said objective function is a function for which a distance or an orientation requested by an analyzation business is not provided .

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses objective function is a function for which a distance or an orientation requested by an analyzation business is not provided (Mining Spatial Data Deviation and Evolution Rules)." The Examiner points to no reference disclosing any function for which a distance or an orientation requested by an analyzation business is not provided, as recited in claim 2. In fact, Koperski is silent as to any function in which a distance or orientation is not provided.

Further, in "Mining Spatial Data Deviation and Evolution Rules," Koperski merely discloses that spatial characteristic evolution rules summarize the general characteristics of the changing data. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final Office Action fails to disclose

where in Koperski is any teaching or suggestion of any of the steps recited in claim 2. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any defined objective function that is examined in order to introduce spatial rules in which a distance or orientation is not provided.

For at least these reasons, claim 2 would not have been obvious over Koperski.

Claim 3 recites the method of claim 1, further comprising a step of entering as input parameters the definition of a distance, the definition of said starting point or said starting point group and the definition of said objective function.

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses a step of entering as input parameters the definition of a distance, the definition of said starting point or said starting point group and the definition of said objective function (FIG. 3-4 and Algorithm for Multiple Level Spatial Association Rules." The Examiner points to no reference disclosing any step of entering of definition of a distance or starting point or starting point groups, as recited in claim 3. In fact, Koperski is silent as to any entering of definition as input parameters.

Further, in Figs. 3-4 and "Algorithm for Multiple Level Spatial Association Rules," Koperski merely discloses input of a query by a user. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of any of the steps recited in claim 3. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any definition input as input parameters.

For at least these reasons, claim 3 would not have been obvious over Koperski.

Claim 4 recites the method of claim 1, wherein, at said step of calculating said distances, an intermediate table is generated based on starting point set data consisting of said starting point group and said objective function, and in accordance with distance values, attribute values for query points in said database are added together, based on said intermediate table.

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses an intermediate table is generated based on starting point set data consisting of said starting point group and said objective function, and in accordance with distance values, attribute values for query points in said database are added together, based on said intermediate table (Algorithm for Multiple Level Spatial Association Rules, Coarse_predicate_DB)." The Examiner points to no reference disclosing any step of calculating a distance, as recited in claim 4. In fact, Koperski is silent as to any calculating a distance.

Further, in "Algorithm for Multiple Level Spatial Association Rules," Koperski merely discloses input of a query by a user and discovering rules therefrom. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of any of the steps recited in claim 4. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any definition input as input parameters.

For at least these reasons, claim 4 would not have been obvious over Koperski.

Claim 5 recites the method of claim 1, further comprising a step of displaying on a map said distance or said orientation block relative to said starting point or said starting point group.

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses displaying on a map said distance or said orientation relative to said starting point or said starting point group (FIG. 3-4)." The Examiner points to no reference disclosing any distance or orientation relative to a starting point or starting point group, as recited in claim 5. In fact, Koperski is silent as to any distance or orientation relative to a starting point or starting point group.

Further, in Figs. 3-4, Koperski merely discloses an example of a query input from a user and the result of the execution of the method. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of any of the steps recited in claim 5. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any starting point or starting point group.

For at least these reasons, claim 5 would not have been obvious over Koperski.

Additionally, as discussed above, Koperski does not disclose or suggest the features of claim 1, and thus, claims 2-5 depending from claim 1 would not have been obvious over Koperski.

Claims 2-5 are separately patentable from claim 1.

7. <u>Claims 7-10</u>

Claim 7 recites the method of claim 6, wherein said objective function is a function for which a distance or an orientation requested by an analyzation business is not provided .

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses objective function is a function for which a distance or an orientation requested by an analyzation business is not provided (Mining Spatial Data Deviation and Evolution Rules)." The Examiner points to no reference disclosing any function for which a distance or an orientation requested by an analyzation business is not provided, as recited in claim 7. In fact, Koperski is silent as to any function in which a distance or orientation is not provided.

Further, in "Mining Spatial Data Deviation and Evolution Rules," Koperski merely discloses that spatial characteristic evolution rules summarize the general characteristics of the changing data. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of any of the steps recited in claim 7. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any defined objective function that is examined in order to introduce spatial rules in which a distance or orientation is not provided.

For at least these reasons, claim 7 would not have been obvious over Koperski.

Claim 8 recites that the method of claim 6, wherein said orientation block is obtained by employing the numerical value of said orientation used to optimize said objective function.

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses orientation block is obtained by employing the numerical value of said orientation used to

optimize said objective function (FIG. 3-4)." The Examiner points to no reference disclosing any orientation block obtained by employing the numerical value of an orientation used to optimize an objective function, as recited in claim 8. In fact, Koperski is silent as to any employment of a numerical value of an orientation to optimize an objective function.

Further, in Figs. 3-4, Koperski merely discloses an example of a query and the result of the execution of the method. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of any of the steps recited in claim 8. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any optimization of an objective function.

For at least these reasons, claim 8 would not have been obvious over Koperski.

Claim 9 recites that the method of claim 6, wherein a search objective data range, at equal distances from said starting point and from said starting point group, that is appropriate for calculating an orientation is selected as said orientation block.

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses a search objective data range, at equal distances from said starting point and from said starting point group, that is appropriate for calculating an orientation is selected as said orientation block (FIG. 3-4 and Algorithm for Multiple Level Spatial Association Rules." The Examiner points to no reference disclosing any search objective data range, at equal distances from a starting point and from a starting point group, that is appropriate for calculating an orientation

is selected as an orientation block, as recited in claim 9. In fact, Koperski is silent as to any calculation of an orientation.

Further, in Figs. 3-4 and "Algorithm for Multiple Level Spatial Association Rules," Koperski merely discloses input of a query by a user. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final Office Action fails to disclose where in Koperski is any teaching or suggestion of any of the steps recited in claim 9. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any calculation step.

For at least these reasons, claim 9 would not have been obvious over Koperski.

Claim 10 recites that the method of claim 6, further comprising a step of displaying on a map said distance or said orientation block relative to said starting point or said starting point group.

In the Final Office Action, the Examiner merely asserts that "Koperski further discloses displaying on a map said distance or said orientation block relative to said starting point or said starting point group (FIG. 3-4)." The Examiner points to no reference disclosing any distance or orientation block relative to a starting point or starting point group, as recited in claim 10. In fact, Koperski is silent as to any distance or orientation block relative to a starting point or starting point group.

Further, in Figs. 3-4, Koperski merely discloses an example of a query input from a user and the result of the execution of the method. From this teaching, the Final Office Action somehow inexplicably derives that Koperski suggests the claimed invention. However, the Final

Office Action fails to disclose where in Koperski is any teaching or suggestion of any of the steps recited in claim 10. In fact, the exemplary portions of Koperski pointed out by the Final Office Action fail to disclose even any starting point or starting point group.

For at least these reasons, claim 10 would not have been obvious over Koperski.

Additionally, as discussed above, Koperski does not disclose or suggest the features of claim 6, and thus, claims 7-10 depending from claim 6 also would not have been obvious over Koperski.

Claims 7-10 are separately patentable from claim 6.

8. <u>Claim 13</u>

Claim 13 is directed to the spatial data mining apparatus according to claim 12, wherein said intermediate table generation means includes Voronoi diagram preparation means for preparing a Voronoi diagram by using said starting point data in said database, distance calculation means for employing said Voronoi diagram, prepared by said Voronoi diagram preparation means, and said query point data in said database to calculate distances between individual starting points and individual query points and to generate data records, and individual distance calculation means for selecting an optimization function from among objective functions to be examined, and adding together record values, collected from said data records, that are required for optimization of each of said distances. The Examiner asserts that the features of claim 13 would have been obvious over Koperski in view of Ester.

Claim 13 would have been obvious over Koperski in view of Ester only if Koperski and Ester in combination disclose or suggest each and every element as set forth in claim 13, and that one having ordinary skill in the art would have found it obvious to combine the teachings of Ester to the teachings of Koperski. However, Koperski and Ester, alone or in combination, do not disclose at least the steps of optimal distance calculation means for calculating a distance, based on said intermediate table generated by said intermediate table generation means, in order to optimize the value of said objective function that is entered by said input means, as recited in claim 12 from which claim 13 depends.

As discussed above, Koperski is not even concerned with optimizing the value of an objective function entered by an input means.

Moreover, Ester does not disclose the features of claim 12 missing from Koperski. Like Koperski, there is no optimal distance calculation means for calculating a distance, based on said intermediate table generated by said intermediate table generation means, in order to optimize the value of said objective function that is entered by said input means. Ester is also silent as to any optimizing of objective function values. In fact, Ester does not even disclose any Voronoi diagram preparation means for preparing a Voronoi diagram by using a starting point data in a database, distance calculation means for employing the Voronoi diagram, prepared by the Voronoi diagram preparation means, and the query point data in the database to calculate distances between individual starting points and individual query points and to generate data records, or even any individual distance calculation means for selecting an optimization function from among objective functions to be examined, and adding together record values,

collected from the data records, that are required for optimization of each distance, as recited in claim 13.

As set forth in section 3.1, for example, Ester merely discloses a method in which resulting clustering is equivalent to a Voronoi diagram of all representatives.

Accordingly, even if combined, Koperski and Ester do not disclose or even suggest at least these features of claim 12.

Further, one having ordinary skill in the art at the time the invention was made would not have been motivated to combine the teachings of Koperski and Ester without impermissible hindsight. That is, neither the teachings of Koperski nor the teachings of Ester contain something to suggest the desirability of the combination.

The Final Office Action merely states that "it would have been obvious to one ordinarily skilled in the art at the time of the invention was made to modify the Koperski apparatus using voronoi diagram to calculate distance in order to cluster data in a spatial database." However, the Final Office Action fails to indicate where in Koperski or Ester the motivation for such combination may be found. The mere fact that parts of prior art disclosures can be combined is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claim 12 and claim 13 depending therefrom would not have been obvious over Koperski in view of Ester.

9. <u>Claim 16</u>

Claim 16 is directed to the spatial data mining apparatus according to claim 15, wherein said intermediate table generation means includes Voronoi diagram preparation means for preparing a Voronoi diagram by using said starting point data in said database, distance calculation means for employing said Voronoi diagram prepared by said Voronoi diagram preparation means and said query point data in said database to calculate distances between individual starting points and individual query points, orientation calculation means for calculating, based on said distances obtained by said distance calculation means, orientations of said starting points with said query points that fall within a designated distance upper limit, and storing said orientations as data records for said intermediate table, and individual orientation calculation means for selecting an optimization function from among objective functions to be examined, and collecting and adding record values, from said data records, that are required for optimization of each of said distances. The Examiner asserts that the features of claim 16 would have been obvious over Koperski in view of Ester.

Claim 16 would have been obvious over Koperski in view of Ester only if Koperski and Ester in combination disclose or suggest each and every element as set forth in claim 16, and that one having ordinary skill in the art would have found it obvious to combine the teachings of Ester to the teachings of Koperski. However, Koperski and Ester, alone or in combination, do not disclose at least the optimal orientation calculation means for calculating, based on the intermefdiate table generated by the intermediate table generation means, an orientation for optimizing the value of the objective function that is entered by the input means, as recited in claim 15 from which claim 16 depends.

As discussed above, Koperski is not even concerned with optimizing the value of an objective function entered by an input means.

Moreover, Ester does not disclose the features of claim 15 missing from Koperski. Like Koperski, there is no optimal distance calculation means for calculating a distance, based on said intermediate table generated by said intermediate table generation means, in order to optimize the value of said objective function that is entered by said input means. Ester is also silent as to any optimizing of objective function values. In fact, Ester does not even disclose any Voronoi diagram preparation means for preparing a Voronoi diagram by using a starting point data in a database, distance calculation means for employing the Voronoi diagram, prepared by the Voronoi diagram preparation means, and the query point data in the database to calculate distances between individual starting points and individual query points and to generate data records, or even any individual distance calculation means for selecting an optimization function from among objective functions to be examined, and adding together record values, collected from the data records, that are required for optimization of each distance, as recited in claim 16.

As set forth in section 3.1, for example, Ester merely discloses a method in which resulting clustering is equivalent to a Voronoi diagram of all representatives.

Accordingly, even if combined, Koperski and Ester do not disclose or even suggest at least these features of claim 15.

Further, one having ordinary skill in the art at the time the invention was made would not have been motivated to combine the teachings of Koperski and Ester without impermissible

hindsight. That is, neither the teachings of Koperski nor the teachings of Ester contain something to suggest the desirability of the combination.

The Final Office Action merely states that "it would have been obvious to one ordinarily skilled in the art at the time of the invention was made to modify the Koperski apparatus using voronoi diagram to calculate distance in order to cluster data in a spatial database." However, the Final Office Action fails to indicate where in Koperski or Ester the motivation for such combination may be found. The mere fact that parts of prior art disclosures can be combined is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claim 15 and claim 16 depending therefrom would not have been obvious over Koperski in view of Ester.

10. <u>Claims 18-19</u>

Claim 18 is directed to the spatial data mining apparatus according to claim 17, wherein said display means uses said optimal distance calculated by said optimal distance/orientation calculation means for the display of circular areas, the centers of which are starting points. Claim 19 is directed to the spatial data mining apparatus according to claim 17, wherein said display means uses said optimal orientation, calculated by said optimal distance/orientation calculation means, for the display of fan-shaped portions of said circular areas, the origins of said fan-shaped portions being said starting points at said centers of said circular areas. The

Examiner asserts that the features of claims 18-19 would have been obvious over Koperski in view of Knorr.

Claims-19 18 would have been obvious over Koperski in view of Knorr only if Koperski and Knorr in combination disclose or suggest each and every element as set forth in claims 18-19, and that one having ordinary skill in the art would have found it obvious to combine the teachings of Knorr to the teachings of Koperski. However, Koperski and Knorr, alone or in combination, do not disclose at least the steps of, as recited in claim 17 from which claims 18-19 depend. As discussed above, Koperski is not even concerned with calculating any optimal distance.

Moreover, Knorr does not disclose the features of claim 17 missing from Koperski. Like Koperski, there is no calculation of an optimal distance. Knorr does not even disclose any distance calculation steps. In fact, as admitted by the Final Office Action on page 20, Knorr "fails to disclose the step of using said optimal distance calculated for the display of circular areas, the center of which are starting points" and that Knorr "fails to disclose the step of using said optimal orientation for the display of fan-shaped portions of said circular areas, the origins of said fan-shaped portions being said starting points at said centers of said circular areas"

As shown in the exemplary portions of Knorr, there is not even display circular areas, the centers of which are starting points, thereby, no calculation of distances is performed. In fact, Koperski does not even disclose any fan-shaped areas.

Accordingly, even if combined, Koperski and Knorr do not disclose or even suggest at least these features of claim 17.

Further, one having ordinary skill in the art at the time the invention was made would not have been motivated to combine the teachings of Koperski and Knorr without impermissible hindsight. That is, neither the teachings of Koperski nor the teachings of Knorr contain something to suggest the desirability of the combination.

The Final Office Action merely states that "it would have been obvious to one ordinarily skilled in the art at the time of the invention to modify the Koperski technique using circular areas to display the starting point in order to distinguish spatial information" or that "it would have been obvious to one ordinarily skilled in the art at the time of the invention to modify the Koperski technique using a fan-shaped portion of circular areas to display the starting point in order to distinguish spatial information." However, the Final Office Action fails to indicate where in Koperski or Knorr the motivation for such combination may be found. The mere fact that parts of prior art disclosures can be combined is not sufficient to establish *prima facie* case of obviousness. To do so would be falling victim to the impermissible practice of hindsight.

For at least these reasons, claims-19 18 depending from claim 17 would not have been obvious over Koperski in view of Knorr.

VI. CONCLUSION

It is respectfully submitted that, at least for the above reasons, the Examiner has failed established a *prima facie* case under 35 U.S.C. § 103, that claims 1-12, 15, 17 and 20-23 would have been obvious over Koperski , that claims 13 and 16 would have been obvious over Koperski in view of Ester, and that claims 18 and 19 would have been obvious over Koperski in

view of Knorr.

Respectfully submitted,

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APPENDIX

1. A spatial data mining method, for introducing spatial rules from a database in which spatial information, including addresses, is stored, the method comprising the steps of:

providing from said database a starting point or a starting point group;

defining an objective function that is examined in order to introduce said spatial rules; and

calculating a distance or an orientation block originating at said starting point or said starting point group in order to optimize said objective function that is defined.

2. The spatial data mining method according to claim 1, wherein said objective function is a function for which a distance or an orientation requested by an analyzation business is not provided.

3. The spatial data mining method according to claim 1, further comprising a step of:

entering as input parameters the definition of a distance, the definition of said starting point or said starting point group and the definition of said objective function.

4. The spatial data mining method according to claim 1, wherein, at said step of calculating said distances, an intermediate table is generated based on starting point set data consisting of said starting point group and said objective function, and in accordance with distance values,

attribute values for query points in said database are added together, based on said intermediate table.

5. The spatial data mining method according to claim 1, further comprising a step of:

displaying on a map said distance or said orientation block relative to said starting point or said starting point group.

6. A spatial data mining method, for introducing spatial rules from a database in which spatial information, including addresses, is stored, the method comprising the steps of:

providing from said database a starting point or a starting point group;

employing said starting point or said starting point group to define an orientation;

defining an objective function that is examined in order to introduce said spatial rules; and

calculating a distance or an orientation block originating at said starting point or said starting point group in order to optimize said objective function that is defined.

7. The spatial data mining method according to claim 6, wherein said objective function is a function for which a distance or an orientation requested by an analyzation business is not provided.

8. The spatial data mining method according to claim 6, wherein said orientation block is obtained by employing the numerical value of said orientation used to optimize said objective function.

9. The spatial data mining method according to claim 6, wherein a search objective data range, at equal distances from said starting point and from said starting point group, that is appropriate for calculating an orientation is selected as said orientation block.

10. The spatial data mining method according to claim 6, further comprising a step of:

displaying on a map said distance or said orientation block relative to said starting point or said starting point group.

11. A spatial data mining method, for generating a data table used to introduce a spatial rule obtained from a spatial information database, the method comprising the steps of:

providing a set of starting points and a set of query points in a database;

designating an upper limit for a distance between said set of starting points and said set of query points;

calculating a distance between each starting point and each query point;

calculating an angle formed between a starting point and a query point whose distance from said starting point does not exceed said designated upper limit; and

generating a data table using said angle formed with said starting point.

12. A spatial data mining apparatus for calculating an optimal distance from a database, wherein spatial information, including addresses, is stored, the apparatus comprising:

input means for inputting of an objective function required for the optimization of a distance;

intermediate table generation means for employing in said database starting point data and query point data for calculating the distances between each starting point and each query point and generating an intermediate table; and

optimal distance calculation means for calculating a distance, based on said intermediate table generated by said intermediate table generation means, in order to optimize the value of said objective function that is entered by said input means.

13. The spatial data mining apparatus according to claim 12, wherein said intermediate table generation means includes:

Voronoi diagram preparation means for preparing a Voronoi diagram by using said starting point data in said database;

distance calculation means for employing said Voronoi diagram, prepared by said Voronoi diagram preparation means, and said query point data in said database to calculate distances between individual starting points and individual query points and to generate data records; and

individual distance calculation means for selecting an optimization function from among objective functions to be examined, and adding together record values, collected from said data records, that are required for optimization of each of said distances.

15. A spatial data mining apparatus for calculating an optimal orientation for a database, which includes spatial information, including addresses, the apparatus comprising:

input means for inputting of an objective function required for the optimization of an orientation;

intermediate table generation means for employing, based on starting point data and query point data in said database, angles of 0 degrees from said starting points in a specific direction to generate an intermediate table in which the orientation of the locations of said query points are included; and

optimal orientation calculation means for calculating an orientation, based on said intermediate table generated by said intermediate table generation means, for optimizing the value of said objective function that is entered by said input means.

16. The spatial data mining apparatus according to claim 15, wherein said intermediate table generation means includes:

Voronoi diagram preparation means for preparing a Voronoi diagram by using said starting point data in said database;

distance calculation means for employing said Voronoi diagram prepared by said Voronoi diagram preparation means and said query point data in said database to calculate distances between individual starting points and individual query points;

orientation calculation means for calculating, based on said distances obtained by said distance calculation means, orientations of said starting points with said query points that fall within a designated distance upper limit, and storing said orientations as data records for said intermediate table; and

individual orientation calculation means for selecting an optimization function from among objective functions to be examined, and collecting and adding record values, from said data records, that are required for optimization of each of said distances.

17. A spatial data mining apparatus, for calculating an optimal distance from or an optimal orientation with a database in which spatial information, including addresses, is stored, and for outputting said optimal distance or said optimal orientation, the apparatus comprising:

input means for the input of an objective function for which a distance or an orientation requested by an analyzation business is not provided;

optimal distance/orientation calculation means for employing starting point data and query point data in said database for calculating a distance between, or the orientation of each of the starting points with each of the query points, and calculating said optimal distance or said optimal orientation for the optimization of the value of said objective function; and

display means for displaying, on the screen of a geographical information system, said optimal distance or said optimal orientation calculated by said optimal distance/orientation calculation means.

18. The spatial data mining apparatus according to claim 17, wherein said display means uses said optimal distance calculated by said optimal distance/orientation calculation means for the display of circular areas, the centers of which are starting points.

19. The spatial data mining apparatus according to claim 17, wherein said display means uses said optimal orientation, calculated by said optimal distance/orientation calculation means, for the display of fan-shaped portions of said circular areas, the origins of said fan-shaped portions being said starting points at said centers of said circular areas.

20. A spatial data mining apparatus, for introducing a spatial rule from a database, which also includes spatial information, including addresses, the apparatus comprising:

starting point provision means for providing starting points or starting point groups obtained from said database;

objective function definition means for defining an objective function that is to be examined in order to introduce said spatial rule; and

distance calculation means for calculating distances originating at said starting points or at said starting point groups for optimizing said objective function that is defined.

21. A spatial data mining apparatus, for introducing a spatial rule from a database, which also includes spatial information, including addresses, the apparatus comprising:

starting point provision means for providing starting points or starting point groups obtained from said database;

orientation definition means for employing said starting points or said starting point groups to define distances or orientations;

objective function definition means for defining an objective function that is to be examined in order to introduce said spatial rule; and

orientation block calculation means for calculating orientation blocks beginning at said starting points or said starting point groups to optimize said objective function that is defined.

22. A spatial data mining apparatus, for generating data table for introducing a spatial rule from a database, which also includes spatial information, including orientation, the apparatus comprising:

starting point/query point provision means for providing a set of starting points and a set of query points in said database;

distance upper limit designation means for designating the upper limit for a distance between said set of starting points and said set of query points;

distance calculation means for calculating a distance between each starting point and each query point;

angle calculation means for calculating an angle formed between a starting point and a query point whose distance from said starting point does not exceed said designated upper limit; and

a data table generation means for generating a data table using said angle formed with said starting point.

23. A storage medium on which is stored a spatial data mining program, which introduces a spatial rule extracted from a database that includes spatial information, including addresses, based on an objective function for which neither a distance nor an orientation is provided, said program comprising the steps of:

providing a starting point or a starting point group from said database;

employing said starting point or said starting point group to define a distance or an orientation;

defining an objective function that is to be examined; and

calculating a distance measured from said start point or said starting point group, or an orientation block to optimize said objective function that is defined.